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METHOD AND DEVICE FOR RECOGNIZING AN INDIVIDUAL
[PROCÉDÉ ET DISPOSITIF DE RECONNAISSANCE D'UN INDIVIDU]

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Description /2*

The present invention concerns a method and device for recognizing an individual.

The problem of recognizing individuals arises more and more often, and in the most varied areas.

Thus, for example, the development of computer technology and telematics has entailed the multiplication of terminals, from which a great amount of information, some of which is confidential, is available. Some of these terminals also are interactive, that is, they may be used to give commands to a computer or to modify data stored in the memory.

In particular this problem occurs in the banking area where it is now possible for the holder of an account to perform some operations from a terminal of the "Minitel" type that can be connected to any telephone socket.

The solution adopted up to now has consisted in requiring that the user provide, preferably at any consultation or operation, a "confidential code" which, alone, permits access to the computer, that is, to an account given in the above example.

However, this solution is not entirely satisfactory, since access is permitted by simple knowledge of the confidential code even if the code has been obtained accidentally or even by fraudulent means.

Also in the banking area, the problem of recognizing individuals arises at the time of using credit cards or memory cards in automatic teller

*Numbers in the margin indicate pagination in the foreign text.

machines. In fact, this problem is very general, and is also found in magnetic "badge" or electronic lock technology.

Therefore means of physically recognizing an individual, independent of any code or any means that is external to him, has been sought.

Thus, computer recognition of the voice, form of the retina, or finger prints of the subject has been proposed, but the results are unreliable and also necessitate very complicated information processing.

The present invention is intended to provide an inexpensive and reliable method and device for recognizing an individual.

For this purpose the object of the invention is a method for recognizing an individual, wherein a first signal is emitted in the direction of one of the individual's arteries, the resulting Doppler signal is detected, and this Doppler signal is recorded in a memory; subsequently, a second signal substantially identical to the first signal is emitted in the direction of the same artery, the resulting Doppler signal is recorded and the form of this second Doppler signal is compared with the form of the previously stored Doppler signal resulting from the first emission, and the individual is recognized if the forms of the two signals correspond.

The correspondence between the forms of the two signals can be determined by means of any predetermined criterion.

Means for emitting and recording these Doppler signals are already known per se, and used in the medical field for using blood velocimetry diagnostic techniques.

However, it has been surprisingly found that the form of the Doppler signal thus obtained is a characteristic unique to each individual like, for example, fingerprints. If follows from this that by initially recording the signal of an individual it is subsequently possible to recognize this individual with certainty.

Thus it is possible to know if the individual can have access to such information or can perform such an operation.

The signals used may be, for example, electromagnetic signals, and it has been confirmed that particularly good results are obtained with high frequency (HF) signals in the 9 to 11 MHz band, preferably between 9.5 and 10.5 MHz.

The chosen artery is preferably a digital artery such as one of the two index fingers so that the test can be made as simple as possible. Then the identification is made by simply placing the subject's finger on an appropriate sensor.

The Doppler signal resulting from the first emission mentioned above can be immediately registered in the memory of a computer.

This will be the case, in particular, when access to this computer is desired, for example in "Minitel" banking applications.

However, this Doppler signal can also be recorded on a card /3 such as a magnetic card or a memory card, on any other support.

The bank memory card can, for example, have this recording, which will make it possible to locally verify that its user is indeed the owner.

The signal can also be recorded simultaneously on a card and in the memory of a computer, in order to increase the reliability of the test.

The object of the invention is a device for recognizing an individual wherein it includes means for performing a Doppler measure on an artery of a finger of an individual, memorization means containing, in coded form, the signal resulting for such a measurement made preliminarily, and means for comparing the form of the output signal of the measurement means with the form of the signal stored in the memory.

The measurement means can, in a specific embodiment of the invention, include two substantially identical HF electromagnetic sensors, and means for detecting the pulsations resulting from the simultaneous operation of the two probes.

As was mentioned above, the memorization means can comprise the memory of a computer or a card such as a magnetic card or a memory card, or any other support.

The means of comparison preferably comprise a programmed computer. A relatively simple recognition program, such as already exists, may be used for this purpose.

A specific embodiment of the invention will now be described as a non-limiting example with reference to the appended schematic drawings in which:

Fig. 1 is an electric diagram of a sensor which makes it possible to use the method according to the invention and,

Fig. 2 is a diagram of a device according to the invention.

The sensor 1 of Fig. 1 first comprises two oscillators 2 and 2' each run by a crystal 3 and 3', respectively.

The two oscillators 2 and 2' are as much identical to each other as possible. In particular, the two crystals 3 and 3' must have the same frequency, preferably around 10 MHz, and the variation of this frequency, in particular as a function of the time and the temperature, must be the same for the two crystals.

The agreement of the two oscillator circuits 2 and 2' is obtained by adjusting their variable condensers as will be described below.

The output of the oscillator 2 is transmitted by the intermediary of an inductance insulation coil 4 to an oscillating circuit 5 composed of an inductance coil 6 and a body contact resistor 7.

The output of the oscillator 2' is transmitted by the intermediary of the insulation induction coil 4' to an oscillating circuit 5' formed of an inductance coil 6' and a variable condenser 8.

The two high frequency signals thus obtained taken respectively at the common points of the inductance coils 4 and 6 on the one hand and 4' and 6' on the other hand, are each transmitted to a sensor 9 and 9' respectively. The two sensors 9 and 9' each consist of a stainless steel body and area separated from one another by an epoxy resin 10 layer assuring insulation.

The two sensors 9 and 9' and the resin 10 are assembled in order to form a button capable of receiving one of the user's index fingers.

For this purpose each of the sensors 9 and 9' occupies half of the button, the plane of the epoxy layer 10 being perpendicular to this surface.

Preferably the button consisting of the sensors 9 and 9' and the resin 10 is a push button, connected by the intermediary of a relay to a delay circuit 11 which permits the functioning of the device for a certain time after the button has been pushed.

Because of the blood flow in the user's digital artery, the frequencies detected at the level of the sensors 9 and 9' are shifted with respect to the frequency of the oscillators 2 and 2'. The result of this is, by the Doppler effect, a pulsation signal that is picked up at the common point of the inductance coil 6 and the resistor 7.

This signal, which is a high frequency signal, is provided at the input of a detection and preamplification unit 12, essentially consisting of condensers 13 connected in series between the input into the circuit 12 and the input into an operation amplifier 14. This amplifier is looped by a counter-reaction resistor 15, chosen so that the gain of the amplifier 14 is on the order of 1000.

The output of the amplifier 14 is then a low frequency signal, /3 which is amplified by means of a traditional low frequency amplifier 16.

It is the output signal of the amplifier 16 that is used for recognizing the individual whose index finger is placed on the sensors 9 and 9'.

The agreement of the oscillators 2 and 2' is achieved by means of variable condensers of these circuits, so as to obtain no pulsation at the input of the circuit 12 when the sensors 9 and 9' are free.

Then it is observed that when a user places his index finger on the button consisting of these sensors, the low frequency signal obtained has a frequency of around 1 Hz and a form which is characteristic of the individual.

The delay circuit 11 is controlled so as to activate the device for a period on the order of 3 to 5 seconds so as to detect three periods of the low frequency signal, in order to improve the recognition.

Fig. 2 shows a device 20 according to the invention which includes a sensor 1 as described above.

The output of the sensor 1 is applied, by the intermediary of an interface circuit 21, to a calculation unit 22 such as the central unit of a computer. This calculation unit 22 is connected to a memory 23 in which the signals characteristic of the authorized users, either of the computer comprising unit 22 or of any element connected to this computer, are stored. The output 24 of the calculation unit 22 can therefore be looped to the computer itself, or be connected to any peripheral device for validation of the latter.

For example, in the above-mentioned application of the data bank access device, the output signal 24 of the unit 22 will permit the use of a terminal with which the sensor 1 is associated.

The comparison between the signal coming from the sensor and the signal or signals stored in the memory 23 is made in the unit 22 by means of an appropriate form recognition program.

The memory 23 is loaded at the time of the delivery of a utilization authorization to a given user by means of a sensor 1A similar to pick-up 1, by the intermediary of an interface circuit 21A. Thus, when any individual places his index finger on the sensor 1 button, the delay 11 causes the detection of the characteristic low frequency signal and its transmission to the central unit 22. Then the latter determines if the received signal corresponds to one of the signals contained in the memory 23.

The emission of the signal by the sensor 1 can be combined with the emission by a terminal associated with a code number or an account number, in which case the unit 22 determines of the characteristic signal received by the sensor 1 corresponds to the signal associated with this code number or this account number in the memory 23.

Different versions and modifications of the preceding description can be made without departing from the scope or spirit of the invention. In particular, the invention is absolutely not limited to the banking area, it being possible to connect the calculation unit to an electronic lock or any data base.

Claims

1. A method of recognizing an individual, wherein a first signal is emitted in the direction of one of the individual's arteries, the resulting Doppler signal is detected, and this Doppler signal is recorded in a memory; then subsequently, a second signal substantially identical to the first signal is emitted in the direction of the same artery, the resulting Doppler signal is detected, the form of this second Doppler signal is compared with the form of the previously stored Doppler signal resulting from the first emission, and the individual is recognized if the forms of the two signals correspond.

2. The method according to Claim 1, wherein these signals are electromagnetic signals.

3. The method according to Claim 2, wherein these electromagnetic signals are periodic continuous signals of a frequency between 9 and 11 MHz, and preferably between 9.5 and 10.5 MHz.

4. The method according to any one of Claims 1 to 3, wherein this artery is the digital artery of an index finger.

5. The method according to any one of Claims 1 to 4, wherein the Doppler signal resulting from the first emission is recorded in the memory of a computer.

6. The method according to any one of Claims 1 to 5, wherein the Doppler signal resulting from the first emission is recorded on a card such as a magnetic card or a memory card.

7. The method according to the set of Claims 5 and 6, wherein the signal recorded on the card is also compared with the signal recorded in the computer memory.

8. A device for recognizing an individual, wherein it comprises /5 means - (1) for performing a Doppler measurement on an artery of an individual, storage means - (23) containing in coded form the signal resulting from a previously performed measure of this kind, and means (22) for comparing the form of the output signal of the measuring means to the form contained in the memory.

9. The device according to Claim 8, wherein the measurement means comprise two substantially identical HF electromagnetic sensors (9, 9') and means for detecting the pulsations resulting from the simultaneous operation of the two sensors.

10. The device according to any one of Claims 8 and 9, wherein the storage means comprise the memory of a computer.

11. The device according to any one of Claims 8 and 9, wherein the storage means comprise a magnetic card or a memory card.

12. The device according to any one of Claims 8 to 11, wherein the means of comparison comprise a programmed computer.

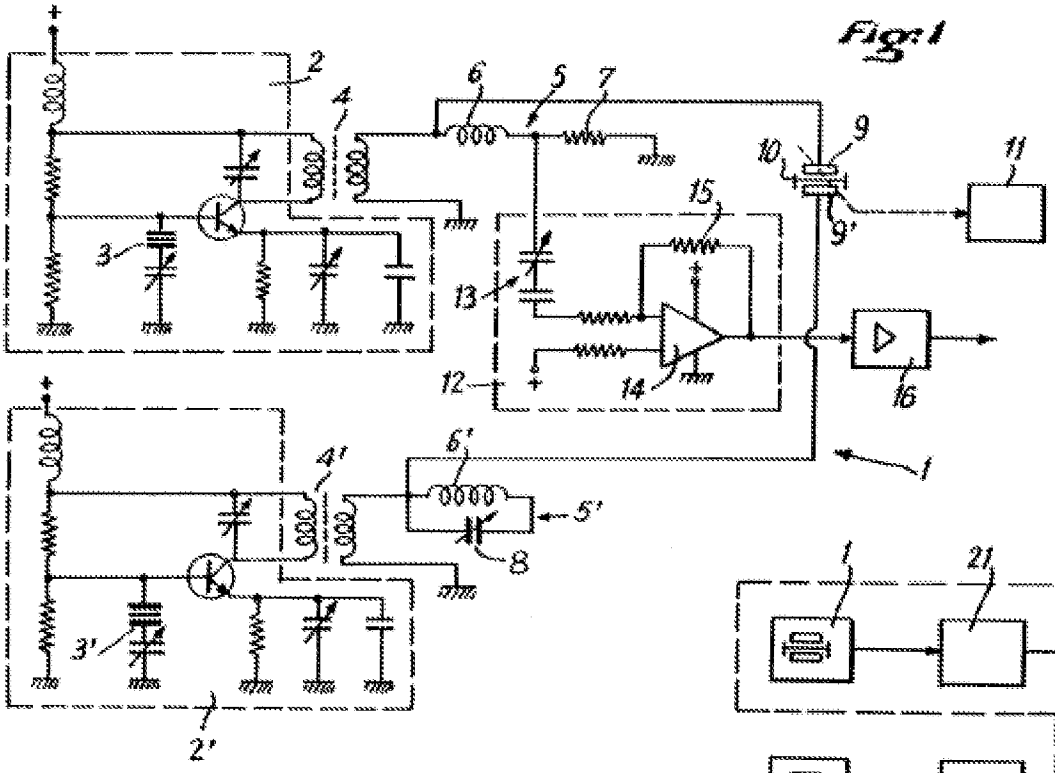

Fig: 1

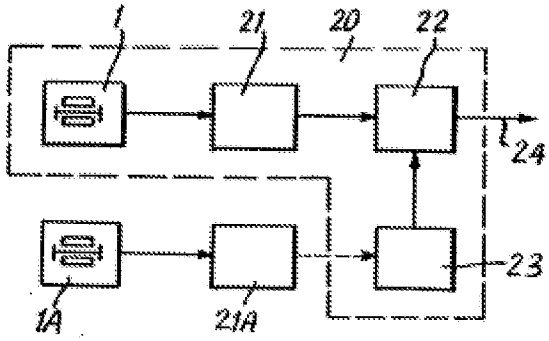

Fig: 2